ORDER NO. GAD8601006 C1
A1

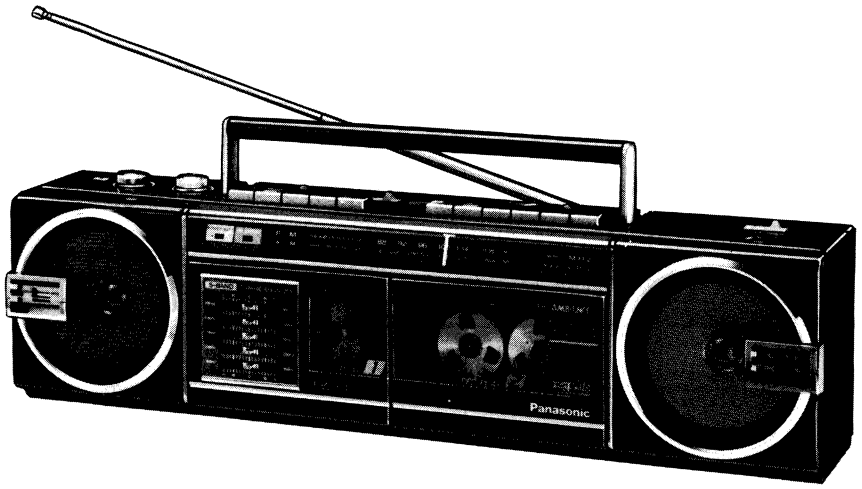
Service Manual

Radio Cassette

RX-FW20

(Black)
(Silver)

FM-AM-FM Stereo Dual Cassette Recorder



This is the Service Manual for the following areas.

[M]...For U.S.A.

[C]...For Canada.

Color Variation

Area	Color
[M]	Black
[C]	Black & Silver

RX-FW20 Mechanism Series

■ SPECIFICATIONS

General:

Power Requirement:	AC; 120 V, 60 Hz with included AC adaptor RD-9448M (RD-9403MC for Canada)
	Battery; 9 V (Six "D" Size Flashlight Batteries) (Panasonic UM-1 or equivalent)
	Car Battery; with optional car adaptor RP-917H
Power Consumption:	10 W (AC only)
Power Output:	7 W (3.5 W×2)... RMS (max.)
Speaker:	Woofer; 4" (10 cm) PM Dynamic Speaker (2.7Ω)
	Tweeter; ¾" (2 cm) Ceramic Speaker (200Ω)
Input:	MIX. MIC; sensitivity 5 mV/applicable microphone impedance 200~600Ω, Ø3.5 Recom. Mic WM-2298
	Line in; sensitivity 224 mV/47 kΩ over
Output:	Headphones; 32Ω, Ø3.5
Dimensions:	19 11/16" (W)×5" (H)×4" (D) (492×126×100) mm
Weight:	4 lbs. 14 oz. (2.2 kg) without batteries

Radio Section:

Radio Frequency Range:	FM; 88~108 MHz
	AM; 525~1610 kHz
Intermediate Frequency:	FM; 10.7 MHz
	AM; 455 kHz
Sensitivity:	FM; 2.5 µV/50 mW output
	AM; 100 µV/m/50 mW output

Tape Deck Section:	TAPE 1
Frequency Response:	70~13,000 Hz (with normal tape)
Tape Speed:	1⅞ ips (4.8 cm/s)
Track System:	4-track 2-channel stereo playback
Tape Deck Section:	TAPE 2
Frequency Response:	70~13,000 Hz (with normal tape)
Recording System:	AC bias, Magnet erase
Tape Speed:	1⅞ ips (4.8 cm/s)
Track System:	4-track 2-channel stereo recording and playback

Weights and dimensions shown are approximate.
(Les poids et dimensions mentionnes sont approximatifs.)
Design and specifications are subject to change without notice.

Panasonic®

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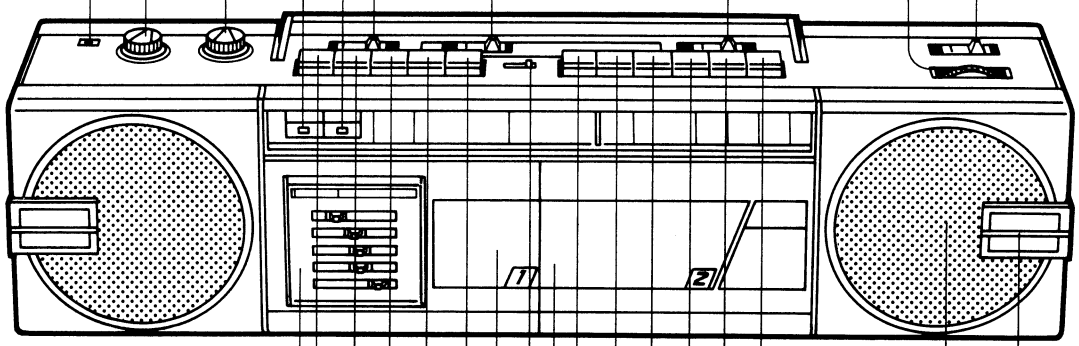
LOCATION OF CONTROLS AND COMPONENTS



Power/Battery Check Indicator (POWER/BATT)
FM Stereo Indicator (FM STEREO)
Band Selector (BAND)
Balance Control (BALANCE)
Function Selector (SELECTOR)
Tuning Control (TUNING)
Volume Control (VOLUME)
Dubbing Selector (DUBBING)
Mode Selector/ Beat Proof Switch (MODE/B.P)
Built-in Microphone (MIC)
Graphic Equalizer Controls (5-BAND GRAPHIC EQUALIZER)
Speakers (Tweeter) [2 cm, 200Ω]
Speakers (Woofer) [10 cm, 2.7Ω]

TAPE 1

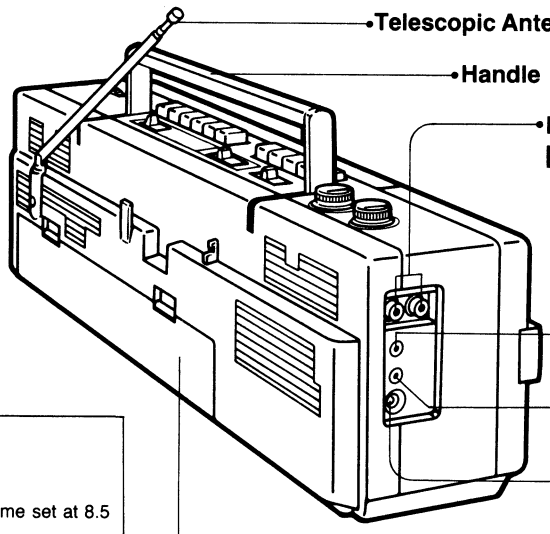
Controls for Playback

- Pause Button (❚❚ PAUSE)
- Stop/Eject Button (⏏STOP/EJECT)
- Fast Forward/Cue Button (⏩ FF/CUE)
- Rewind/Review Button (⏪ REW/REV)
- Playback Button (◀ PLAY)
- Cassette Compartment

TAPE 2

Controls for Recording and Playback

- Record Button (● RECORD)
- Playback Button (◀ PLAY)
- Rewind/Review Button (⏪ REW/REV)
- Fast Forward/Cue Button (⏩ FF/CUE)
- Stop/Eject Button (⏏STOP/EJECT)
- Pause Button (❚❚ PAUSE)
- Cassette Compartment
- Tape Counter and Reset Button (TAPE 2 COUNTER)



Telescopic Antenna
Handle
Line Input Jacks (LINE IN) [224 mV, 47 kΩ]
Mixing Microphone Jack (MIXING MIC) [5 mV, 200~600Ω, ∅3.5]
Headphones Jack (PHONES) [32Ω, ∅3.5]
DC Input Jack (DC IN 9 V ⊖-◉-⊕)
Battery Compartment

BATTERY SERVICE LIFE

UM-1 (D-size) Batteries
Approx. 17 hours of recording (EIAJ)
Approx. 12.5 hours of playback (EIAJ) with volume set at 8.5 position

The above battery service life is measured according to the conditions set forth by EIAJ (Electronic Industries Association of Japan). As the battery service life varies with the method of operation and environmental conditions, use these values as reference.

DISASSEMBLY INSTRUCTIONS

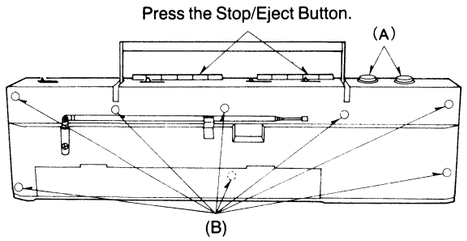


Fig. 1

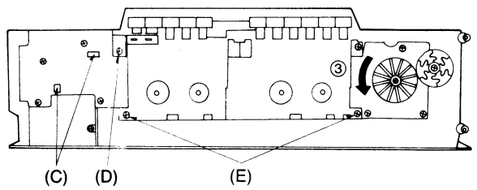


Fig. 2

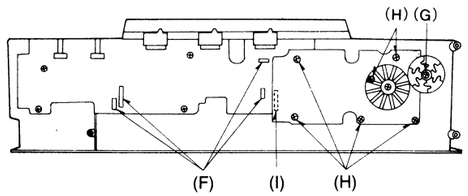


Fig. 3

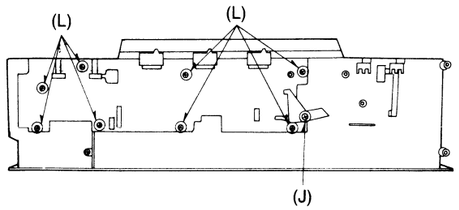


Fig. 4

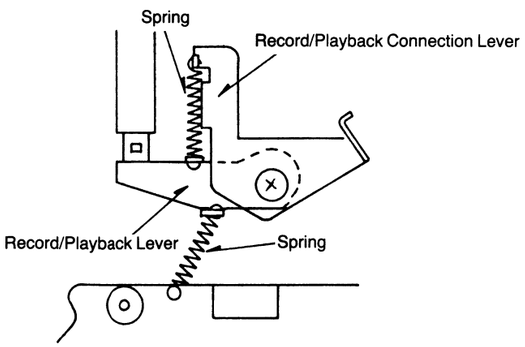


Fig. 5

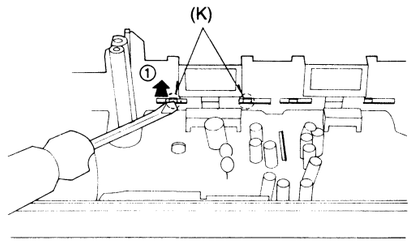


Fig. 6

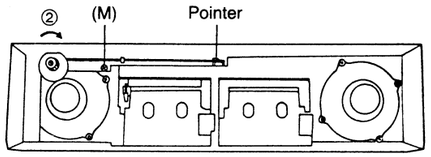


Fig. 7

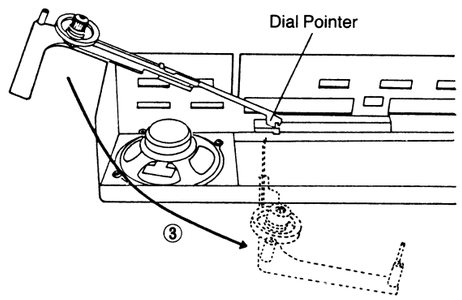


Fig. 8

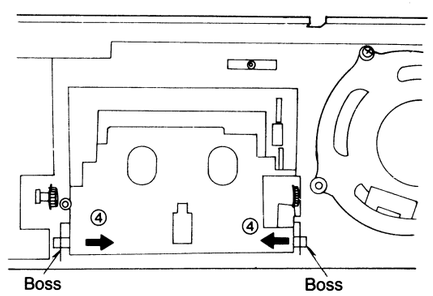


Fig. 9

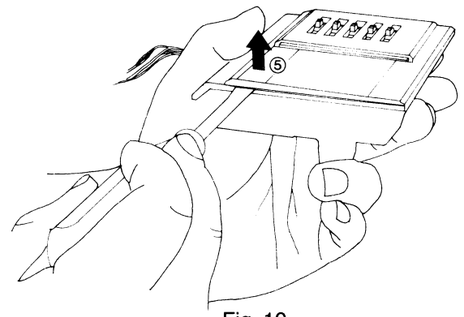
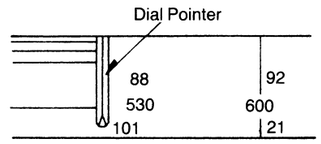


Fig. 10

•Precautions for attachment of front panel (Dial setting point)



1. Line up the indicator with the position shown in the figure.
2. Turn the variable capacitor drum all the way in the direction of arrow ③. (See Fig. 2.)

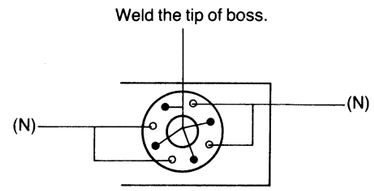
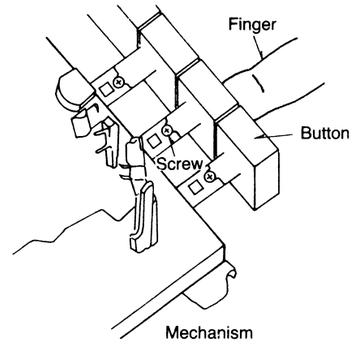


Fig. 11

•Precautions for removing mechanism button



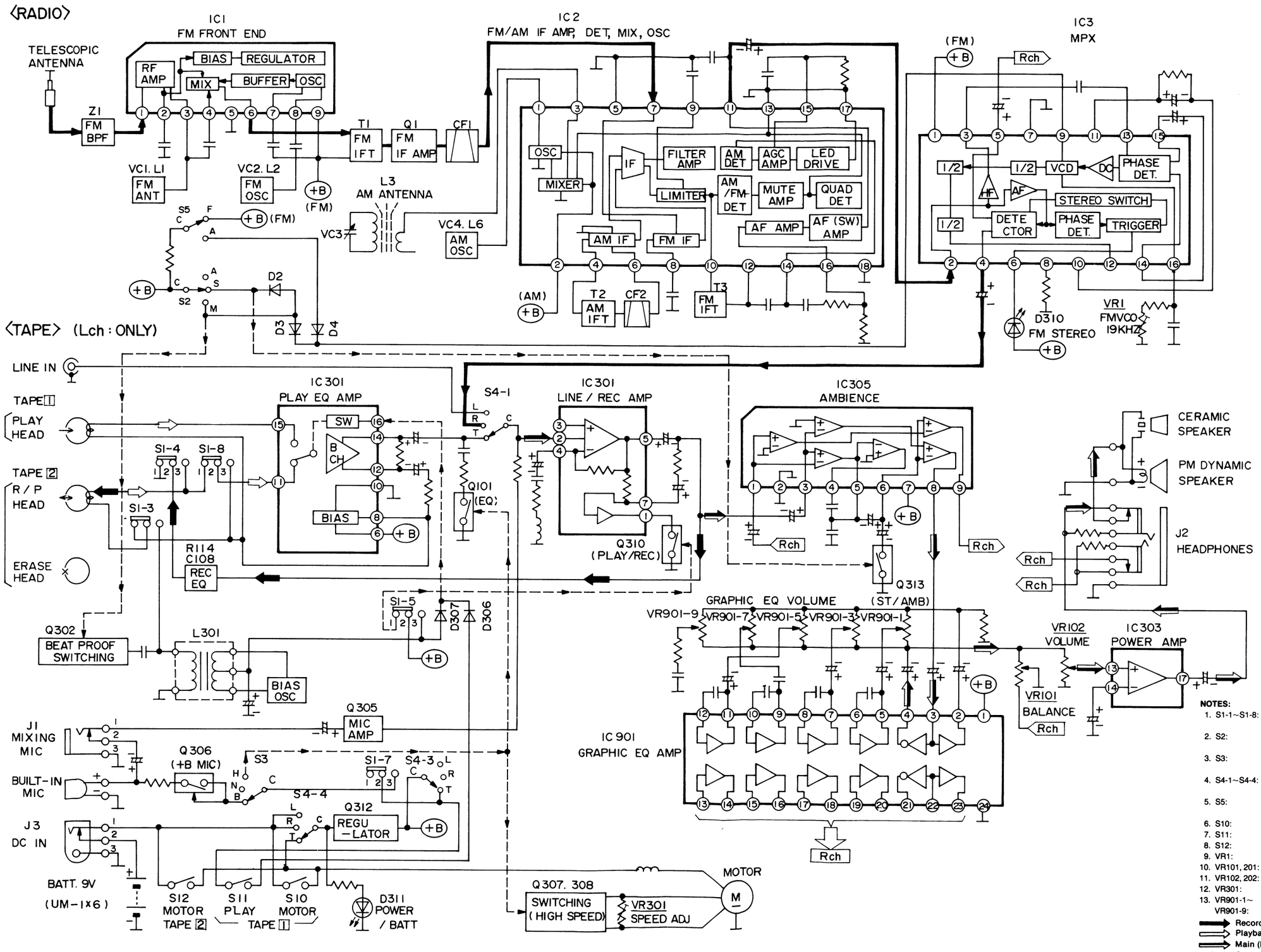
When removing the mechanism buttons, be sure to depress the buttons while turning their respective screws.

Ref. No.	Shown in Fig.—.	To remove —.	Remove —.
1	1	Front Cabinet	Knob ..... (A)×2
2	1		Screw (3×50) mm ..... (B)×8
3	1		Press the Stop/Eject button.
4	2		Socket (CS4, CS9) ..... (C)×2
5	2	LED Circuit Board (*1)	Screw (3×10) mm ..... (D)×1
6	2	Mechanism (Tape [1], [2])	Screw (3×10) mm ..... (E)×2
7	3		Socket (CS1, CS2, CS5, CS6) ..... (F)×4
8	3	Intermediate Gear	Screw (3×10) mm ..... (G)×1
9	3	Tuner Circuit Board	Screw (3×10) mm ..... (H)×6
10	3		Socket (CS3) ..... (I)×1
11	4	Record/Playback Lever (•2)	Screw (3×10) mm ..... (J)×1
12	6	Switch Lever	Push the lug in the direction of arrow ①. ..... (K)×2 (Do not push with too much force as this may cause the lug to break.)
13	4	Main Circuit Board	Screw (3×10) mm ..... (L)×8
14	7	Dial Chassis	Turn the tuning knob in the direction of arrow ② and move the indicator all the way to the right.
15	7		Screw (3×10) mm ..... (M)×1
16	8		Remove the dial chassis with the tuning knob connected and move it in the direction of arrow ③ to remove the dial pointer.
17	9	Cassette Cover	Push the boss in the direction of arrow ④ and pull it off.
18	10	Cassette Panel Ass'y (Tape [1])	Insert the tip of ⊖ driver to the slit of cassette panel and lift the cassette panel in the direction of arrow ⑤.
19	11	Tweeter (•3)	Cut the tip of boss ..... (N)×4

*1) The LED circuit board screws also secure the mechanism in place.
*2) When this screw is removed, the record/playback lever and record/playback connecting lever become separate, so attach them as shown in Fig. 5 in assembly.
•3) Weld the tip of boss as shown in Fig. 11.

D

BLOCK DIAGRAM



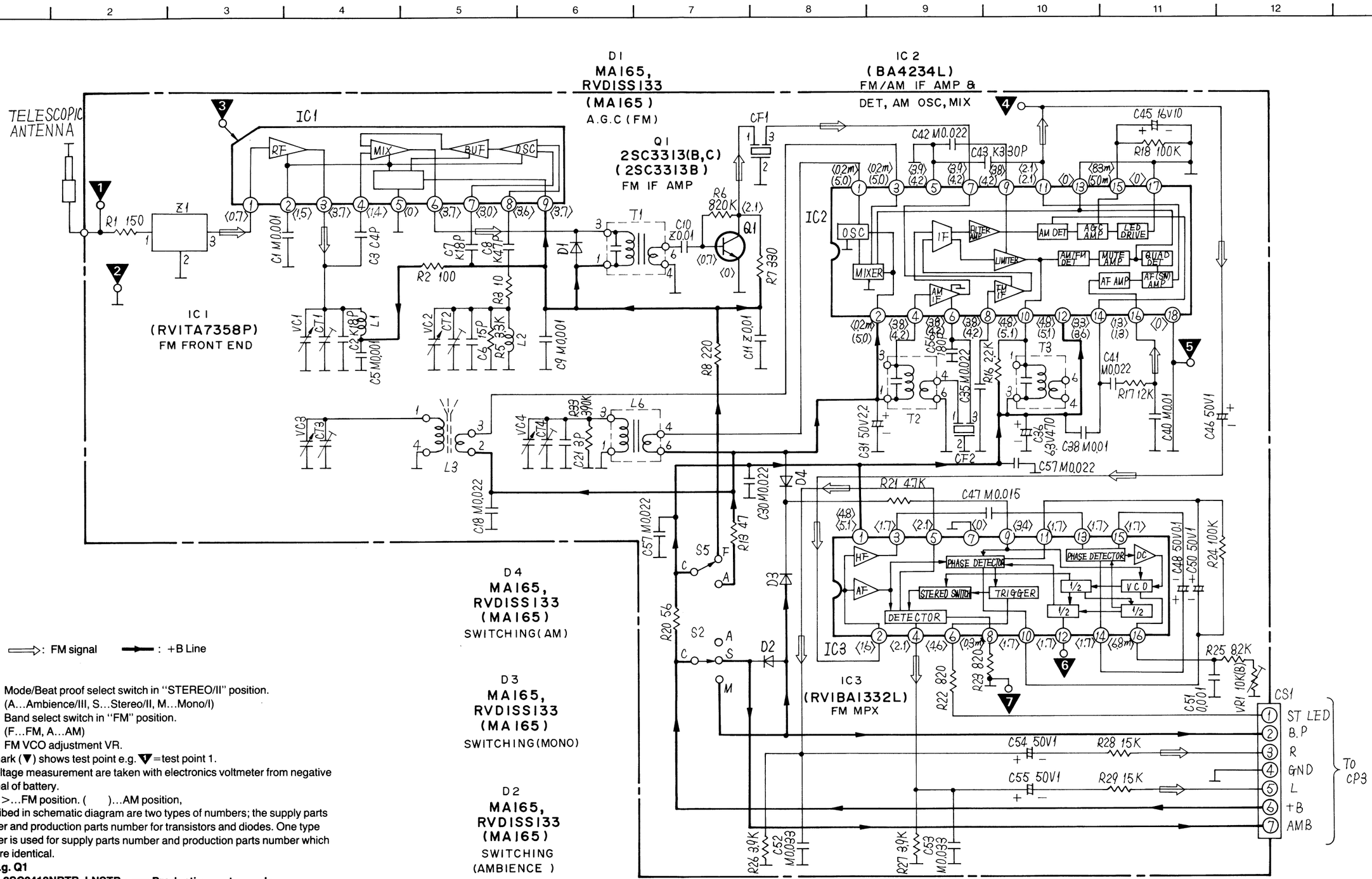
NOTES:

1. S1-1~S1-8: Record/playback switch in "PLAYBACK" position. (1...Playback, 3...Record)
2. S2: Mode/Beat proof select switch in "STEREO/II" position. (A...Ambience/III, S...Stereo/II, M...Mono/I)
3. S3: Dubbing mode select switch in "BUILT-IN MIC" position. (H...High speed, N...Normal speed, B...Built-IN MIC)
4. S4-1~S4-4: Function select switch in "POWER OFF/TAPE" position. (L...Line IN, R...Radio, T...Power off/Tape)
5. S5: Band select switch in "FM" position. (F...FM, A...AM)
6. S10: Motor ON/OFF switch in "OFF" position. } TAPE 1
7. S11: Play ON/OFF switch in "OFF" position. }
8. S12: Motor ON/OFF switch in "OFF" position } TAPE 2
9. VR1: FM VCO adjustment VR.
10. VR101, 201: Tone control.
11. VR102, 202: Volume control.
12. VR301: Tape speed adjustment VR.
13. VR901-1~ VR901-9: G. EQ control (150 Hz/330 Hz/1 kHz/3.3 kHz/10 kHz).

Recording signal
Playback signal
Main (Playback/Recording) signal
Control signal
FM signal

▼ Be sure to fold at the (▼) mark so that mark is on the outside.

SCHEMATIC DIAGRAM (for Tuner Section)

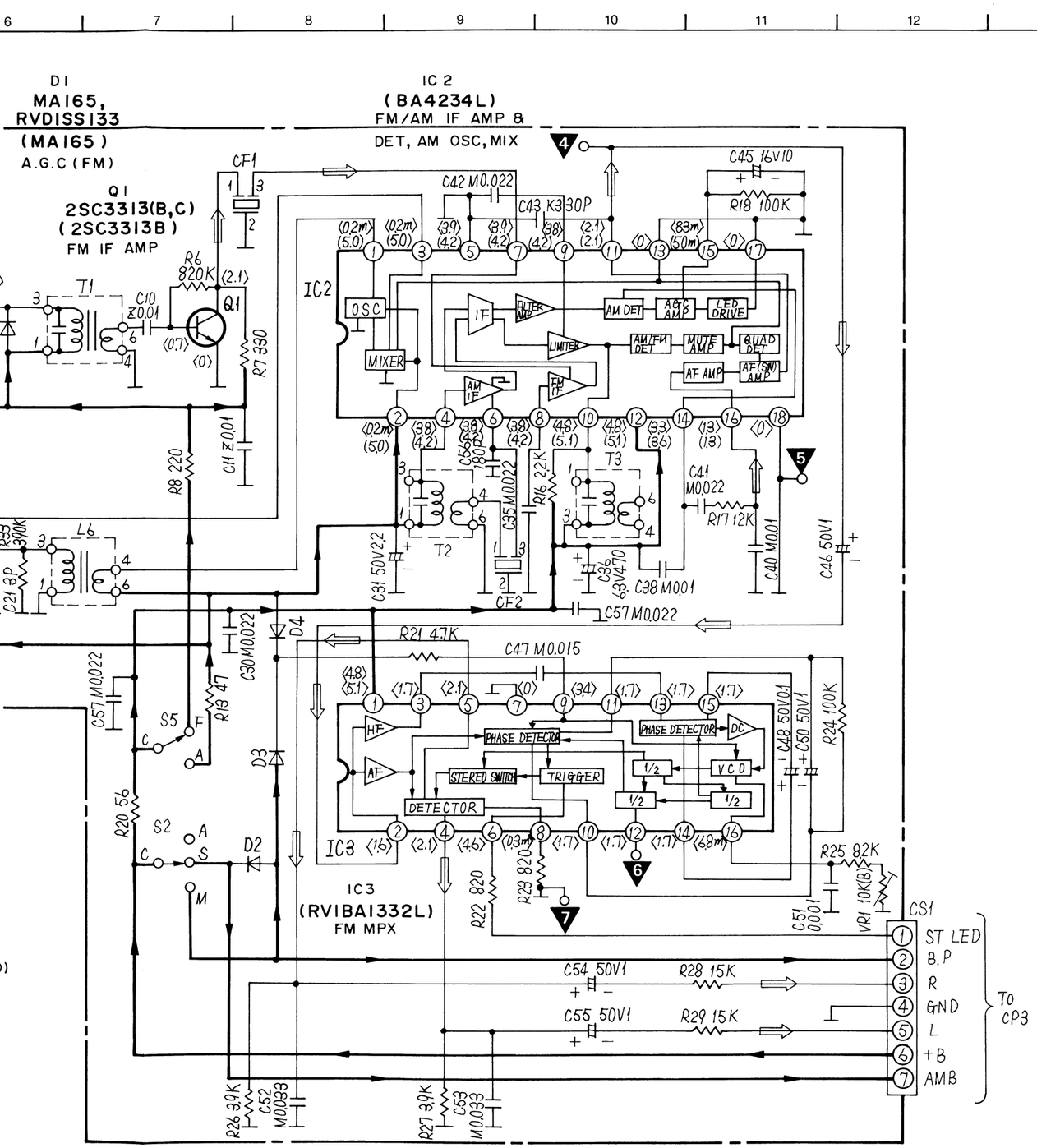


NOTES:

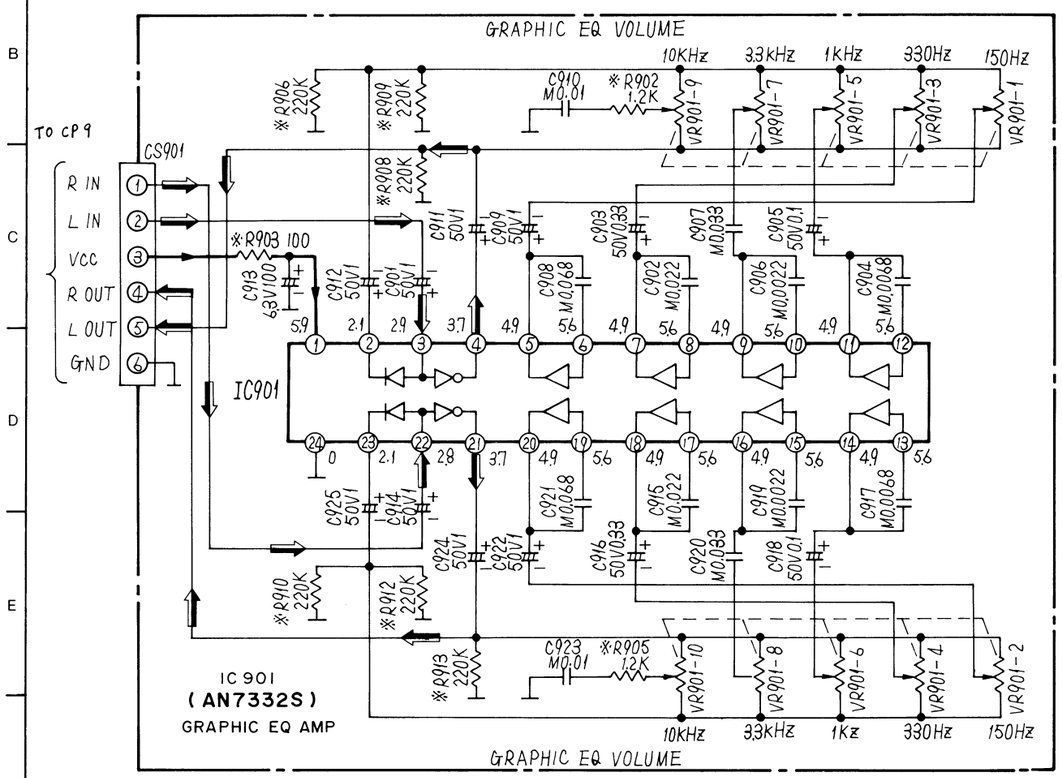
1. S2: Mode/Beat proof select switch in "STEREO/II" position.
   (A...Ambience/III, S...Stereo/II, M...Mono/I)
2. S5: Band select switch in "FM" position.
   (F...FM, A...AM)
3. VR1: FM VCO adjustment VR.
4. The mark (▼) shows test point e.g. ▼=test point 1.
5. DC voltage measurement are taken with electronics voltmeter from negative terminal of battery.
   < >...FM position. ( )...AM position,
6. Described in schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes. One type number is used for supply parts number and production parts number which they are identical.
   e.g. Q1
   2SC2412NRTB, LNSTB ← Production parts number
   (2SC2412) ← Supply parts number
7. The supply parts number is described alone in the replacement parts list.

•This schematic diagram may be modified at any time with the development of new technology.

TIC DIAGRAM (for Tuner Section)



(for Graphic Equalizer Section)



: Main signal, : +B Line

NOTES:

1. VR901-1~901-10: Equalizer control (150 Hz/330 Hz/1 kHz/3.3 kHz/10 kHz)
2. DC voltage measurement are taken with electronics voltmeter from negative terminal of battery.
   No mark...Playback position
3. Described in schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes. One type number is used for supply parts number and production parts number which they are identical.
   e.g. Q1
   2SC2412NRTB, LNSTB ← Production parts number
   (2SC2412) ← Supply parts number
4. ※mark...Printed resistor.
5. The supply parts number is described alone in the replacement parts list.

•This schematic diagram may be modified at any time with the development of new technology.

NOTES:

1. S1-1~S1-8: Record/playback switch in "PLAYBACK" position. (1...Playback, 3...Record)
2. S3: Dubbing mode select switch in "BUILT-IN MIC" position. (H...High speed, N...Normal speed, B...Built-IN MIC)
3. S4-1~S4-4: Function select switch in "POWER OFF/TAPE" position. (L...Line IN, R...Radio, T...Power off/Tape)
4. S10, 12: Motor Switch.
5. S11: Play Switch.... (TAPE 1)
6. VR101: Tone control.
7. VR102, 202: Volume control.
8. VR301: Tape speed adjustment VR.
9. The mark (▼) shows test point e.g.▼=test point 1.
10. DC voltage measurement are taken with electronics voltmeter from negative terminal of battery.
    No mark...Playback position, No mark...Ambience position
    ( )...Recording position,
    ≪ ≫...PB (I) position,
    [[ ]]...High speed dubbing mode.
11. Battery current:
    - No signal ..... 96 mA
    - Maximum output
    - Radio 747mA
    - Tape/Playback ..... 823 mA
    - Tape/Recording ..... 130 mA (Built-IN MIC)
    - Normal Speed Dubbing ..... 163 mA
12. Described in schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes. One type number is used for supply parts number and production parts number which they are identical.
    e.g. Q1
    2SC2412NRTB, LNSTB ← Production parts number
    (2SC2412) ← Supply parts number
4. The supply parts number is described alone in the replacement parts list.

•This schematic diagram may be modified at any time with the development of new technology.

ELECTRICAL PARTS LIST

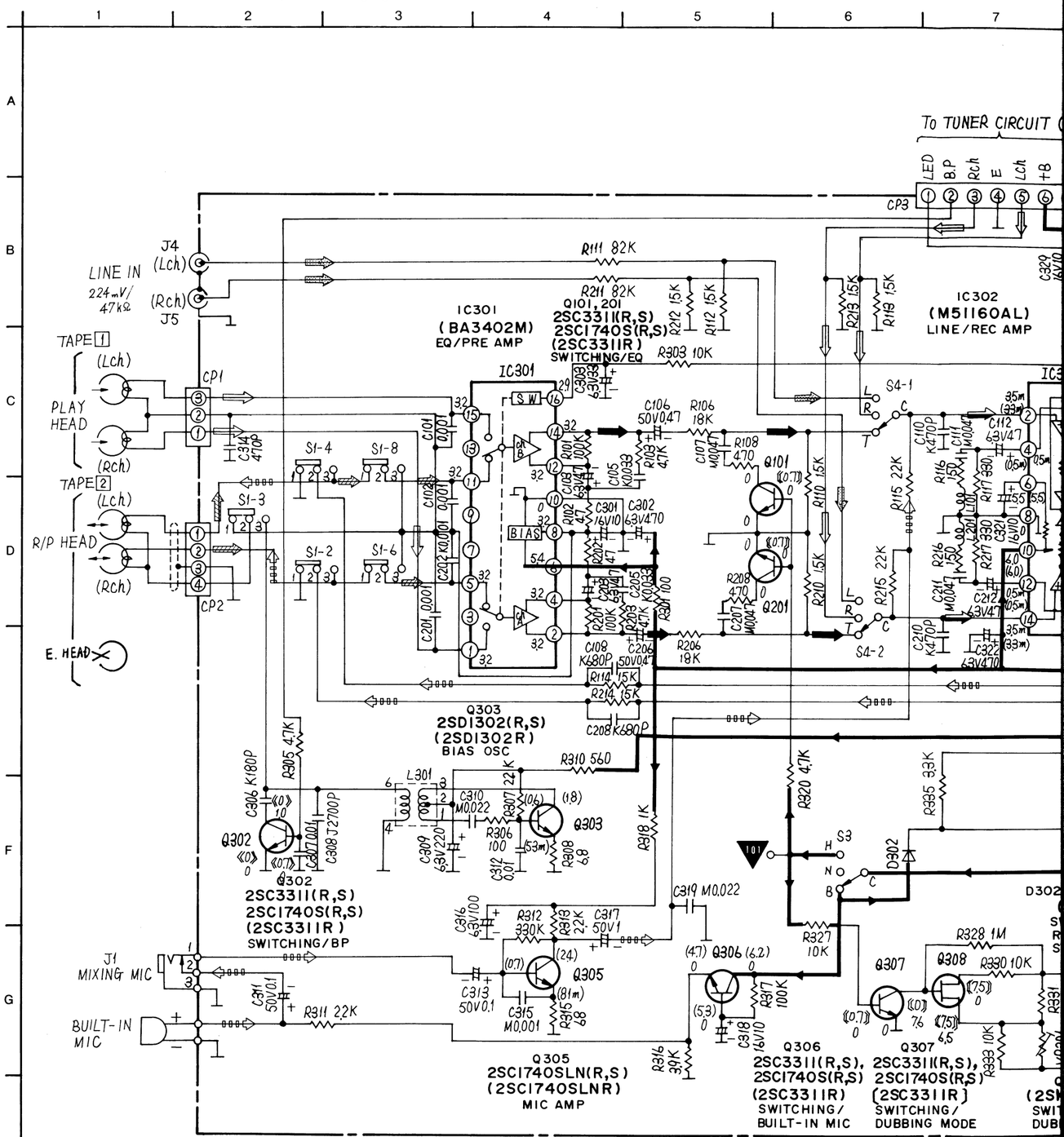
REPLACEMENT PARTS LIST

Ref. No.	Part. No.	Part Name & Description
		INTEGRATED CIRCUITS
IC1	**RVITA7358P**	IC (FM FRONT END)
IC2	**BA4234L**	IC (FM/AM IF AMP & DET, AM OSC, MIX)
IC3	**RVIBA1332L**	IC (FM MPX)
IC301	**BA3402M**	IC (EQ/PRE AMP)
IC302	**M51160AL**	IC (LINE/REC AMP)
IC303	**LA4108R**	IC (POWER AMP)
IC305	**RVIBA6433**	IC (AMBIENCE CONTROL)
IC901	**AN7332S**	IC (GRAPHIC EQUALIZER AMP)
		TRANSISTORS
Q1	**2SC3313B**	Transistor (FM IF AMP)
Q101,201, 302,306,307, 310,313	**2SC3311R**	Transistor (EQ SWITCHING, REGULATOR)
Q303,312	**2SD1302R**	Transistor (BIAS OSC, SWITCHING, REGULATOR) REGULATOR)
Q305	**2SC1740SLNR**	Transistor (MIC AMP)
Q308	**2SK381CD**	FET (SWITCHING)
		DIODES & RECTIFIERS
D1,2,3,4	**MA165**	Diode (AGC, SWITCHING)
D302,303, 305,306 307	**MA165**	Diode (SWITCHING)
D308	**MA4068M**	Diode (REGULATOR)
D310,311	**RVDSEL9203**	LED
		COILS
L2	**RLD4Y53**	Coil (FM ANT)
L3	**RLF2C62**	Coil (AM ANT)
L6	**RL02B105**	Coil (FM OSC)
L101,201	**RLQZB102K**	Coil, Choke
L202,303	**RLQY30S4**	Coil, Choke
L301	**RL09B17**	Coil, Bias Oscillation
L302	**RLQZD101K**	Coil, Choke

Ref. No.	Part. No.	Part Name & Description
		VARIABLE CAPACITORS
VC1,2,3,4 (CT1,2,3,5)	**RCV4LC2V2K**	Variable Capacitor
		VARIABLE RESISTORS
VR1	**EVND4AA00B14**	FM VCO Adjustment VR (10 kΩ/B)
VR101,201	**EWH8MAF10G15**	Tone Control (100 kΩ/A)
VR102,202	**EWCUHAF15A54**	Volume Control (50 kΩ/A)
VR301	**EVND4AA00B53**	Tape Speed Adjustment VR (5 kΩ/B)
VR901	**EVBJT0PA2201**	G.EQ Control (2.2 kΩ/A)
		CERAMIC FILTERS
CF1	**RVF107WDZ**	Ceramic Filter (FM, 10.7 MHz)
CF2	**RVFSFU455B**	Ceramic Filter (AM, 455 kHz)
		FILTER
Z1	**RXABPMB6A**	Band Pass Filter
		TRANSFORMERS
T1,3	**RLI4B153**	IFT (FM 1ST/2ND)
T2	**RLI2B458**	IFT (AM)
		SWITCHES
S1	**RSH2H03W**	Slide Switch (Record/Playback)
S2	**RSS3A15Z**	Slide Switch (Mode/BP)
S3	**RSS3A15Z**	Slide Switch (Dubbing Mode)
S4	**RSS3D21Z**	Slide Switch (Function Selector)
S5	**RSS2B57Z**	Slide Switch (Band Selector)
S10,12	**RFA49Z**	Leaf Switch (Motor)
S11	**RFA42Z**	Leaf Switch (Play/Tape 1)
		JACKS
J1	**RJJ1D20Y**	Jack, Mixing MIC
J2	**RJJ1D27Z**	Jack, Headphones
J3	**RJJ97Y**	Jack, DC IN
J4,5	**RJF1096Z**	Jack, LINE IN

: Playback signal line. (Tape 1)
: Playback signal line. (Tape 2)
: Playback signal line. (Tape 1/Tape 2)
: Recording signal line.

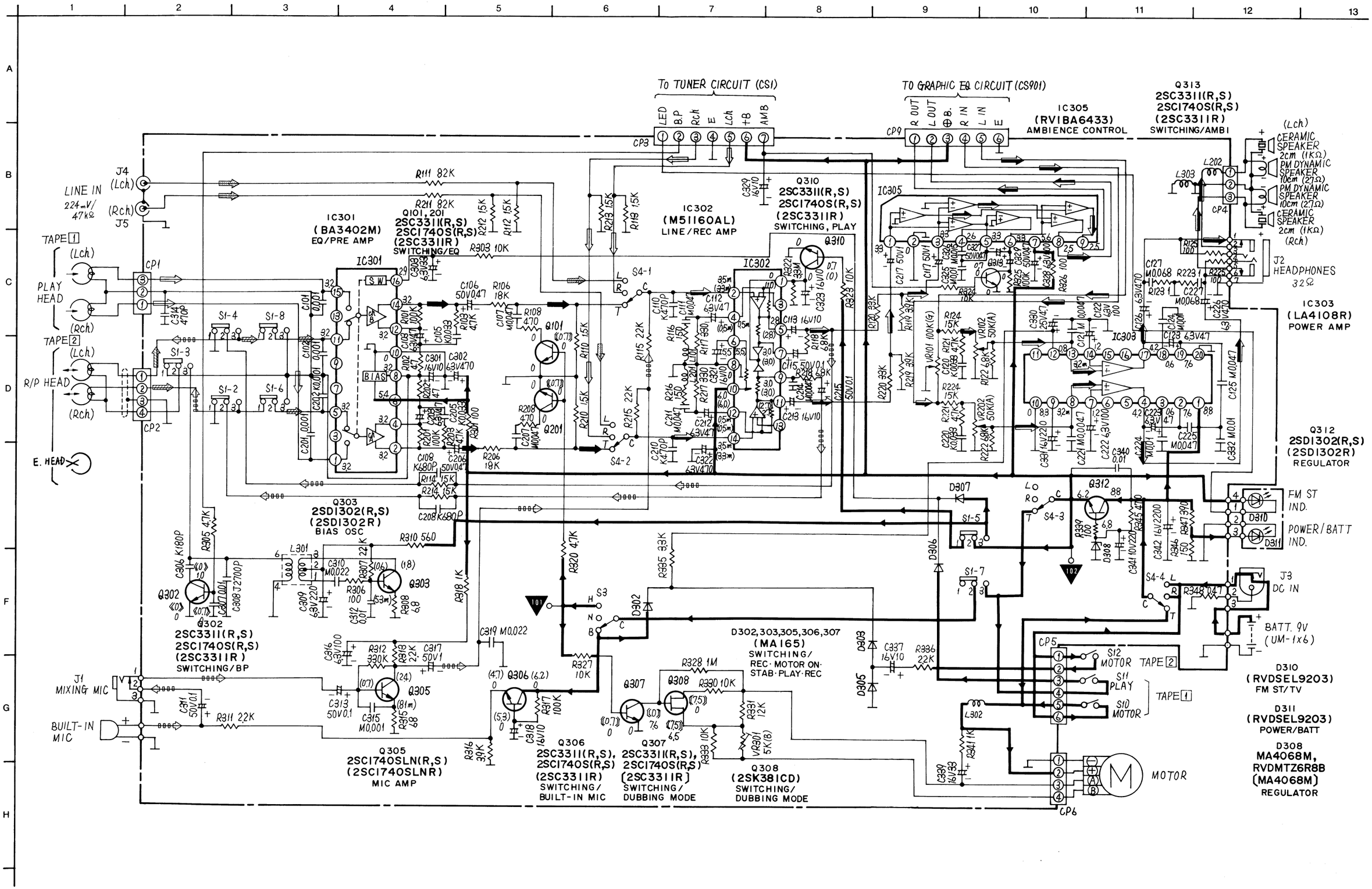
SCHEMATIC DIAGRAM (for Ma



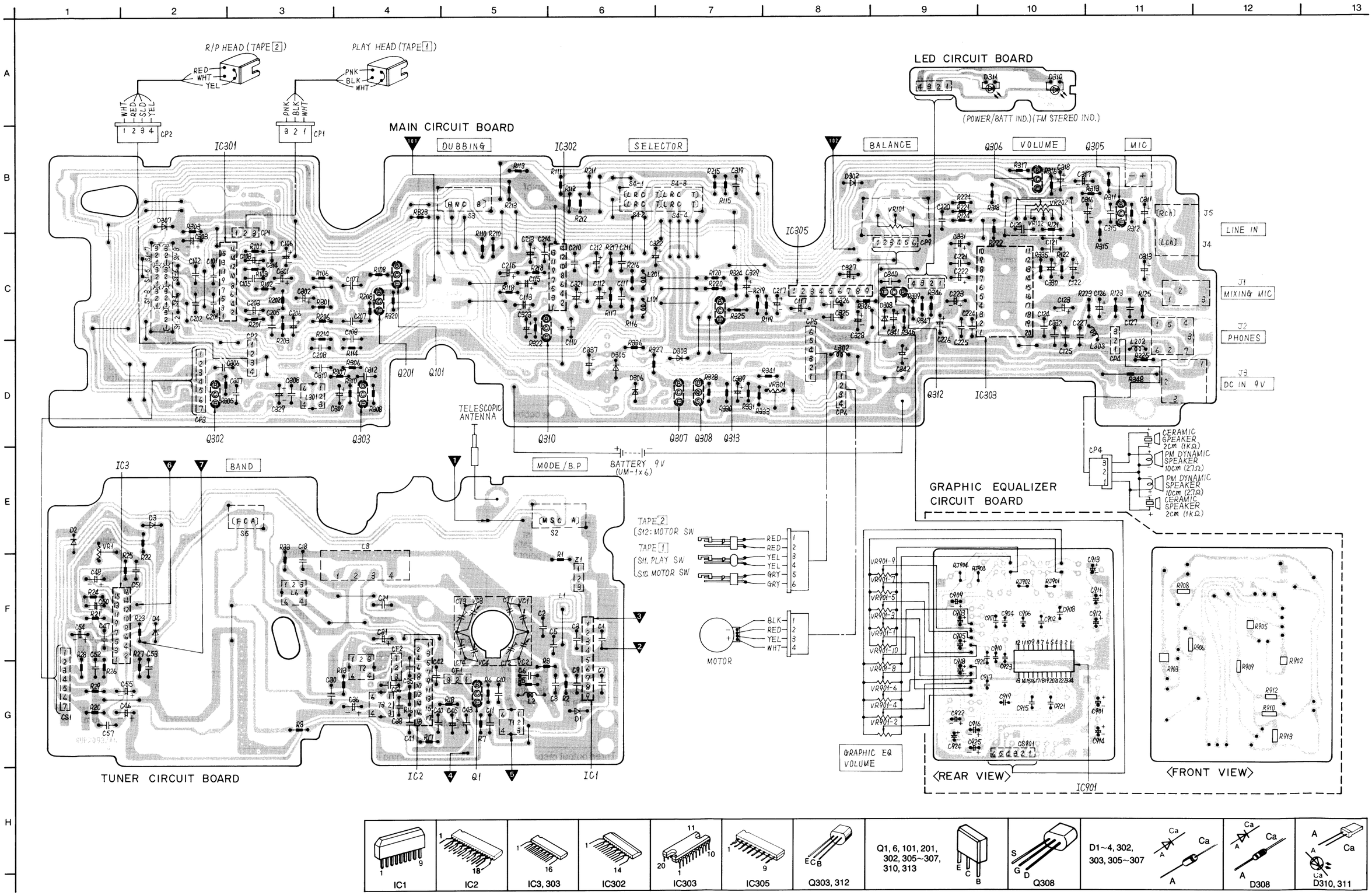
SCHEMATIC DIAGRAM (for Main Section)

: Playback signal line. (Tape 1)
: Playback signal line. (Tape 2)
: Playback signal line. (Tape 1/Tape 2)
: Recording signal line.

: Input (LINE IN) signal line.
: Main (Tape/Radio) signal line.
: Radio (FM) signal line.



CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM



IC1	IC2	IC3, 303	IC302	IC303	IC305	Q303, 312	Q1, 6, 101, 201, 302, 305~307, 310, 313	Q308	D1~4, 302, 303, 305~307	D308	D310, 311

CAPACITORS AND RESISTORS

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value (100Ω)
ERX	2	AN	J	2R2
Type	Wattage	Shape	Tolerance	Value (2.2Ω)

Resistor Type	Wattage Tolerance
ERD: Carbon ERD: Metal Film ERX: Metal Film ERQ: Fuse Type Metal RRD: Carbon (Chip Type)	10 : ⅛ W J : ±5% 12 : ½ W 25 : ¼ W 1 : 1 W 18 : ⅛ W

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value (1000 pF)	Tolerance	Peculiarity
ECEA	50	M	R47	
Type	Voltage	Peculiarity	Value (0.47 μF)	

Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA: Electrolytic ECCD: Ceramic ECKD: Ceramic ECQM: Polyester ECQP: Polyproylene ECET: Electrolytic ECEA□□□N: Non Polar Electrolytic QCU □: Ceramic (Chip Type) ECUX: Ceramic (Chip Type)	OJ : 6.3 V 1A : 10 V 1C : 16 V 1E : 25 V 1H : 50 V 1V : 35 V 50 : 50 V 25 : 25 V 16 : 16 V	2H : 500 V DC 1 : 100 V DKC : 400 V AC	C : ±0.25 pF J : ±5% K : ±10% Z : +80%, −20% P : +100%, −0%

REPLACEMENT PARTS LIST

Ref. No.	Part. No.
CAPACITORS	
C1,5,9	**ECKD1H102MD**
C2,7	**ECCD1H180KC**
C3	**ECCD1H040C**
C6	**ECCD1H150KC**
C8	**ECCD1H470KC**
C10,11	**ECKD1H103ZF**
C18,30,35,41,42	**ECFT1C223MD**
C21	**ECCD1H030C**
C31	**ECEA1HU2R2**
C36	**ECEA0JU471**
C38,40	**ECFT1C103MD**
C43	**ECCD1H331K**
C45	**ECEA1CU100**
C46,50,54,55	**ECEA1HU010**
C47	**ECFT1C153MD**
C48	**ECEA1HU0R1**
C51	**ECQP2A102JZ**
C52,53	**ECFT1C333MD**
C57	**ECFT1C223MD**
C101,102,201,202	**ECKD1H102KB**
C103,112,123,203, 212,223	**ECEA0JU470**
C105,120,205,220	**ECFT1C333KD**
C106,206,327	**ECEA1HUR47**
C107,111,125,207, 211,225	**ECFT1C473MD**
C108,208	**ECKD1H681KB**
C110,210,314	**ECKD1H471KB**
C113,213,301,318, 321,323,329,337	**ECEA1CU100**
C115,215,311,313	**ECEA1HU0R1**
C117,217,317	**ECEA1HU010**
C121,214,221	**ECKD1H472MD**
C122,222,316,328	**ECEA0JU101**
C124,224,332,340	**ECKD1H103MD**
C126,226,302,322	**ECEA0JU471**
C127,227	**ECFT1C683MD**
C303	**ECEA0JU330**
C306	**ECCD1H181K**
C307	**ECKD1H103ZF**
C308	**ECQP2A272JZ**
C309	**ECEA0JU221**
C310,319	**ECFT1C223MD**
C312,325	**ECFT1C103MD**
C315	**ECKD1H102MD**
C326	**ECFT1C153MD**
C330	**ECEA1EU4R7**
C331	**ECEA1CU221**
C339	**ECEA1CU330**
C341	**ECEA1AU221**
C342	**ECEA1CU222**
C901,909,911,912, 914,922,924,925	**ECEA1HKS010**
C902,915	**ECUX1H223MD**
C903,916	**ECEA1HKSR33**
C904,917	**RCUX1H682MD**
C905,918	**ECEA1HKS0R1**
C906,919	**RCUX1H222MD**
C907,920	**ECUX1E333MD**
C908,921	**ECUX1E683MD**
C910,923	**RCUX1E103MD**
C913	**ECEA0JKS101**
RESISTORS	
R1	**ERDS2TJ151**
R2	**ERDS2TJ101**
R3	**ERDS2TJ100**
R5	**ERDS2TJ332**
R6	**ERDS2TJ824**
R7	**ERDS2TJ331**
R8	**ERDS2TJ221**
R13	**ERDS2TJ470**
R16	**ERDS2TJ222**
R17	**ERDS2TJ123**
R18,24	**ERDS2TJ104**
R20	**ERDS2TJ560**
R21	**ERDS2TJ472**
R22,23	**ERDS2TJ821**
R25	**ERDS2TJ822**
R26,27	**ERDS2TJ392**
R28,29	**ERDS2TJ153**
R33	**ERDS2TJ394**
R101,201,317,325	**ERDS2TJ104**
R102,202	**ERDS2TJ470**
R103,203,305,320	**ERDS2TJ472**
R106,206	**ERDS2TJ183**
R108,208,345	**ERDS2TJ471**
R110,112,113,210, 212,213	**ERDS2TJ152**
R111,211	**ERDS2TJ823**
R114,124,214,224	**ERDS2TJ153**
R115,215,307	**ERDS2TJ223**
R116,216,346	**ERDS2TJ151**
R117,217	**ERDS2TJ331**
R118,122,218,222	**ERDS2TJ682**
R119,219,316	**ERDS2TJ392**
R120,220	**ERDS2TJ333**
R121,221	**ERDS2TJ472**
R123,223	**ERDS2TJ1R0**
R125,225,306,326, 339	**ERDS2TJ101**
R301	**ERDS2TJ101**
R303,323,324,327 330,333	**ERDS2TJ103**
R308	**ERDS2TJ6R8**
R310	**ERDS2TJ561**
R311,313	**ERDS2TJ222**
R312	**ERDS2TJ334**
R315	**ERDS2TJ680**
R318,341	**ERDS2TJ102**
R322	**ERDS2TJ335**
R328	**ERDS2TJ105**
R331	**ERDS2TJ123**
R335	**ERDS2TJ332**
R336	**ERDS2TJ222**
R347	**ERDS2TJ391**
R348	**ERX1ANJPR47S**
RJ901,902,903,904	**ERJ6GCJ000**

MEASUREMENTS AND ADJUSTMENTS

■ ALIGNMENT INSTRUCTION

READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

1. Set volume control to maximum.
2. Set graphic equalizer to center.
3. Set band switch to AM or FM.
4. Set function selector to radio.
5. Dubbing select switch to normal
6. Set power source voltage to 9 V DC.
7. Output of signal generator should be no higher than necessary to obtain an output reading.

■ AM ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (ELECTRONICS VOLTMETER or SCOPE)	ADJUSTMENT	REMARKS
		CONNECTIONS	FREQUENCY				
		AM-IF ALIGNMENT					
(1)	AM	Fashion loop of several turns of wire and radiate signal into loop of receiver.	455 kHz 30% Mod. at 400 Hz	Point of non-interference. (on/about 600 kHz)	Output meter across voice coil.	T2 (AM IFT)	Adjust for maximum output.
		AM-RF ALIGNMENT					
(2)	AM	〃	511 kHz	Tuning capacitor fully closed.	〃	L6 (AM OSC Coil)	Adjust for maximum output.
(3)	AM	〃	1,660 kHz	Tuning capacitor fully open.	〃	CT4 (AM OSC Trimmer)	〃
(4)	AM	〃	550 kHz	Tune to signal.	〃	(*1)L3 (AM ANT Coil)	Adjust for maximum output. Adjust L3 by moving coil bobbin along ferrite core.
(5)	AM	〃	1,500 kHz	〃	〃	CT3 (AM ANT Trimmer)	Adjust for maximum output. Repeat steps (2)~(5).

(*1) Cement antenna bobbin with wax after completing alignment.

■ FM ALIGNMENT

	BAND	SIGNAL GENERATOR or SWEEP GENERATOR		RADIO DIAL SETTING	INDICATOR (ELECTRONICS VOLTMETER or SCOPE)	ADJUSTMENT	REMARKS
		CONNECTIONS	FREQUENCY				
		FM-IF ALIGNMENT					
(1)	FM	High side thru. 0.001 μF to test point ❸. Negative side to test point ❷.	10.7 MHz (SWP.)	Point of non-interference. (on/about 90 MHz)	Connect vert. amp. of scope to test point ❹. Negative side to test point ❺.	T1 (FM 1st IFT)	Adjust for maximum amplitude. (Refer to fig. 2).
(2)	FM	〃	〃	〃	〃	T3 (FM 2nd IFT)	Adjust for maximum amplitude. (Refer to fig. 3).
		FM-RF ALIGNMENT					
(3)	FM	Connect to test point ❶ through FM dummy antenna. Negative side to test point ❷.	86.2 MHz	Variable capacitor fully closed.	Output meter across voice coil.	L2 (FM OSC Coil)	(*2) Adjust for maximum output.
(4)	FM		109.2 MHz	Variable capacitor fully open.	〃	CT2 (FM OSC Trimmer)	〃
(5)	FM		106 MHz	〃	〃	CT1 (FM ANT Trimmer)	(*2) Adjust for maximum output. Repeat steps (3)~(5).

(*2) Three output responses will be present; proper tuning is the center frequency.

■ SEPARATION ALIGNMENT

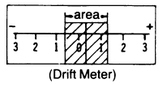
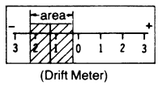
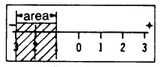
ITEM	FM SIGNAL GENERATOR SOURCE CONNECTION	EQUIPMENT CONNECTION ELECTRONIC COUNTER	ADJUSTMENT	SPECIFICATION	REMARKS
Adjustment of pilot signal.	98 MHz, 60 dB (CW) Connect to test point ❶ through FM dummy antenna. Negative side to test point ❷.	❻...(+) ❼...(−)	VR1	19 kHz	Adjust VR1, for 19 kHz (±100 Hz) reading on electronics counter.

■ TAPE ADJUSTMENT

ITEM	INPUT	MEASUREMENT POINT	SPECIFICATION	ADJUSTMENT POINT	REMARKS
Azimuth	QZZCFM (8 kHz, −20 dB)	SP OUT (AC voltmeter & Oscilloscope)	Maximum output.	Azimuth screw	Playback mode Mode switch→STEREO (Refer to Fig. 4)

■ TAPE SPEED ADJUSTMENT

Tape [2] is driven by the tape [1] motor, so there is no need to adjust the tape speed for tape [2]. (The tape speeds of tape [1] and tape [2] differ due to the diameter of the flywheels. The flywheel for tape [1] has 4 molding marks, and that for tape [2] has 3. (See Figs. 5 and 6.)

ITEM	INPUT	MEASUREMENT POINT	ADJUSTMENT POINT	REMARKS
Tape speed adjustment for normal speed Tape [1].	QZZCWAT (3 kHz)	Headphones jack	VR301	3010±30 Hz (Refer to the figure below when using a drift meter.)  (Drift Meter)
High speed Tape [1]	QZZCWC (1.5 kHz)	Headphones jack	–	Short TP101 and TP102 to double the speed of tape [1]. Note: Cannot be adjusted, but value for reference is about 2955±30 Hz. (Refer to figure below when using a drift meter.)  (Drift Meter)
Normal speed Tape [2]	QZZCWAT (3 kHz)	Headphones jack	–	(1) Remove the short between TP101 and TP102 to return tape [2] to normal speed. (2) About 2997 Hz (3010 Hz is base frequency when tape [1] is at normal speed.) Note: Cannot be adjusted, but recording value is used as a reference. (Refer to figure below when using a drift meter.) (Drift Meter)
High speed Tape [2]	QZZCWC (1.5 kHz)	Headphones jack	–	(1) Short TP101 and TP102 to double the speed of tape [2]. (2) About 2938 Hz (2955 Hz is base frequency when tape [1] is at normal speed.) Note: Cannot be adjusted, but recording value is used as a reference. (Refer to figure below when using a drift meter.)  (Drift Meter)

Note: An extension cable (RZZ0418) can be used to connect the tuner circuit board.

■ ADJUSTMENT POINT

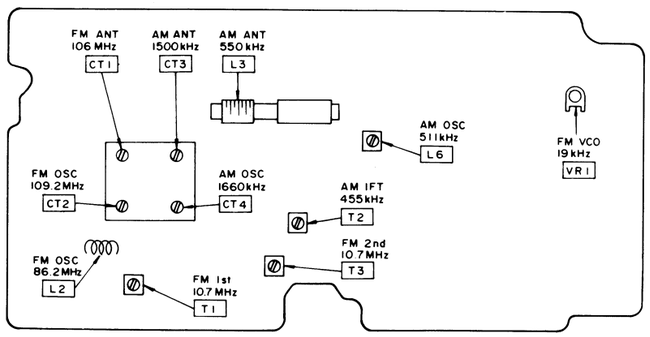

FM ANT 106 MHz CT1
AM ANT 1500kHz CT3
AM ANT 550 kHz L3
AM OSC 511kHz L6
FM VCO 19 kHz VR1
FM OSC 109.2MHz CT2
AM OSC 1660kHz CT4
AM IFT 455kHz T2
FM 2nd 10.7MHz T3
FM OSC 86.2MHz L2
FM 1st 10.7MHz T1

Fig. 1

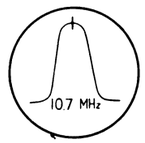


Fig. 2

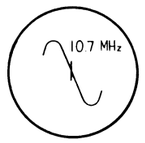


Fig. 3

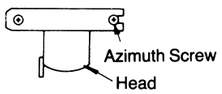


Fig. 4

■ FLYWHEEL

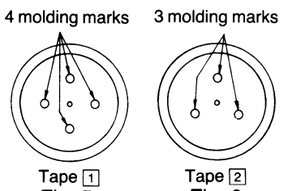
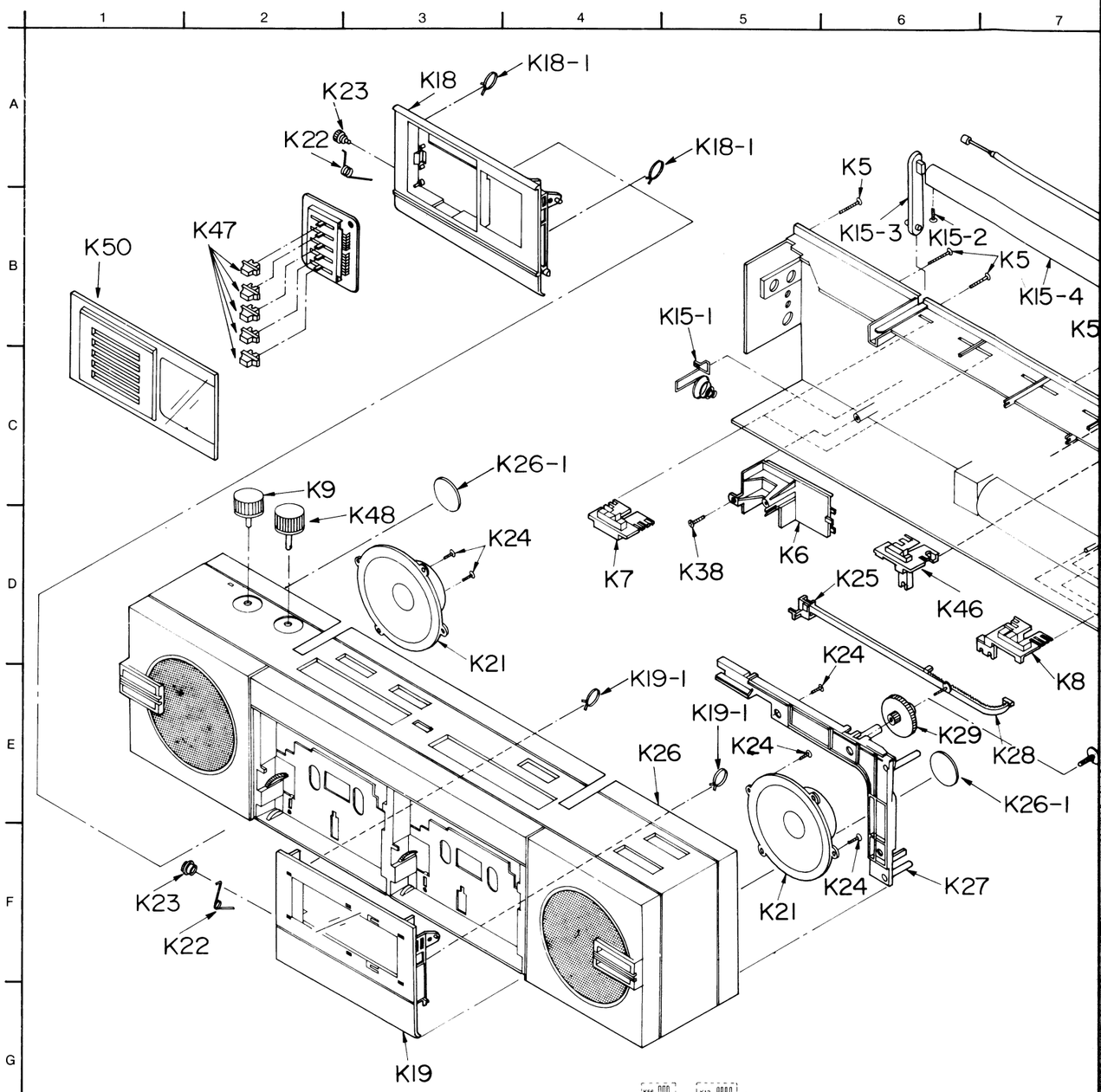
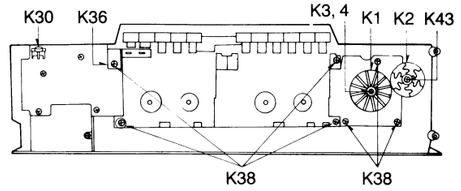
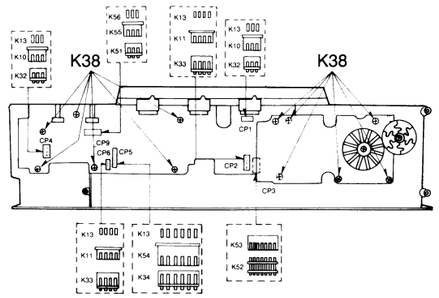


Fig. 5 Fig. 6

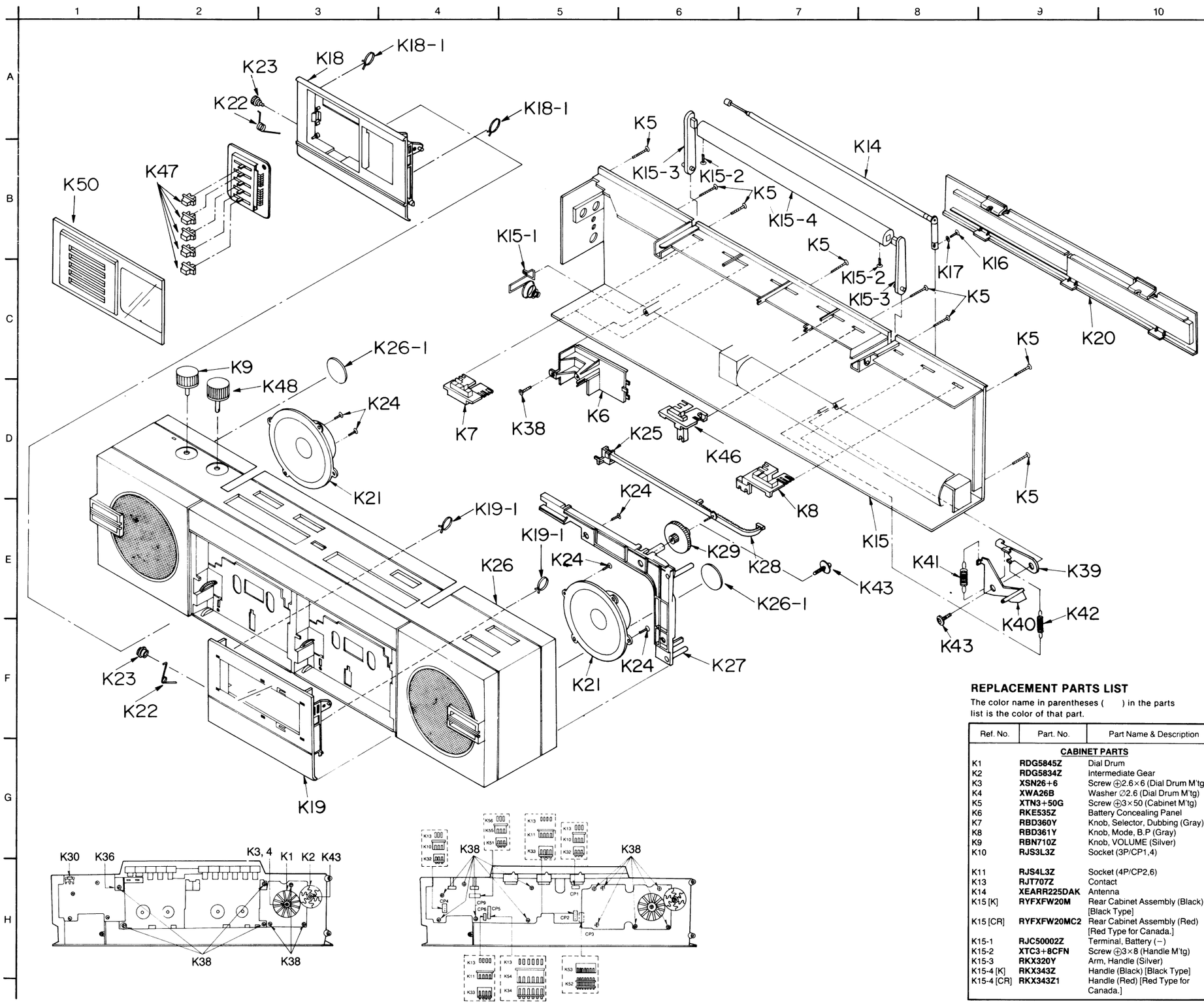
CABINET PARTS LOC







CABINET PARTS LOCATION



Notes:
[K]...Black Type
[CR]...For Canada. (Red Type)

Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part. No.	Part Name & Description
K16	**XSN3+10S**	Screw ⊕3×10 (Antenna M'tg)
K17	**XWA3B**	Washer ∅3 (Antenna M'tg)
K18 [K]	**RYQ1XFW20M1**	Cassette Holder Assembly (Black) [Black Type]
K18 [CR]	**RYQ1XFW20MC1**	Cassette Holder Assembly (Red) [Red Type for Canada.]
K18-1	**RUS595Z**	Spring, Cassette Holder
K19 [K]	**RYQ2XFW20M1**	Cassette Holder Assembly (Black) [Black Type]
K19 [CR]	**RYQ2XFW20MC1**	Cassette Holder Assembly (Red) [Red Type for Canada.]
K19-1	**RUS595Z**	Spring, Cassette Holder
K20 [K]	**RYNXFW20J**	Battery Cover Assembly (Black) [Black Type]
K20 [CR]	**RYNXFW20J2**	Battery Cover Assembly (Red) [Red Type for Canada.]
K21	**EAS10P241SG**	Speaker, Woofer
K22	**RUS645Z**	Spring, Cassette Holder
K23	**RDG5782Z**	Dumper Gear Assembly
K24	**XTV3+8G**	Screw ⊕3×8 (Speaker, Dial Chassis M'tg)
K25	**RDP303Z**	Pointer (White)
K26 [K]	**RYMXFW20M**	Front Cabinet Assembly (Black) [Black Type]
K26 [CR]	**RYMXFW20MC2**	Front Cabinet Assembly (Red) [Red Type for Canada.]
K26-1	**RAF04E4A01**	Speaker, Tweeter
K27	**RUA667Z**	Dial Chassis
K28	**RDE156Z**	Rack, Pointer
K29	**RBT254Z**	Knob, Tuning (Silver)
K30	**RJM157Z**	Built-in Microphone
K32	**RJP3G4Y**	Plug (3P/CP1,4)
K33	**RJP4G4Y**	Plug (4P/CP2,6)
K34	**RJP6G4Y**	Plug (6P/CP5)
K36	**RJT1031Z**	Terminal, Earth
K38	**XTV3+10G**	Screw ⊕3×10 (MECHA, P.C.B M'tg)
K39	**RUB435Z**	Record/Playback Lever
K40	**RUB436Z**	Record/Playback Connection Lever
K41	**RUD47Z**	Spring, Record/Playback Connection Lever
K42	**RUD46Z**	Spring, Record/Playback Lever
K43	**XTWS3+10Q**	Screw ⊕3×10 (Intermediate Gear, R/P Lever, Tuning Knob M'tg)
K46	**RBD399Z**	Knob, Band Selector (Gray)
K47	**RBD400Z**	Knob, Graphic Equalizer Controls (Silver)
K48	**RBN742Z**	Knob, BALANCE (Silver)
K50	**RYPXFW20M**	Cassette Panel Assembly (Black)
K51	**RJP6G20Z**	Plug (6P/CP9)
K52	**RJP7G21Z**	Plug (7P/CP3)
K53	**RJS7M2Y**	Socket (7P/CS3)
K54	**RJS6L3Z**	Socekt (6P/CP5)
K55	**RJS6L15Z**	Socket (6P/CP9)
K56	**RJS6L16Z**	Socket (6P/CS9)

REPLACEMENT PARTS LIST

The color name in parentheses ( ) in the parts list is the color of that part.

Ref. No.	Part. No.	Part Name & Description
	CABINET PARTS	
K1	**RDG5845Z**	Dial Drum
K2	**RDG5834Z**	Intermediate Gear
K3	**XSN26+6**	Screw ⊕2.6×6 (Dial Drum M'tg)
K4	**XWA26B**	Washer ∅2.6 (Dial Drum M'tg)
K5	**XTN3+50G**	Screw ⊕3×50 (Cabinet M'tg)
K6	**RKE535Z**	Battery Concealing Panel
K7	**RBD360Y**	Knob, Selector, Dubbing (Gray)
K8	**RBD361Y**	Knob, Mode, B.P (Gray)
K9	**RBN710Z**	Knob, VOLUME (Silver)
K10	**RJS3L3Z**	Socket (3P/CP1,4)
K11	**RJS4L3Z**	Socket (4P/CP2,6)
K13	**RJT707Z**	Contact
K14	**XEARR225DAK**	Antenna
K15 [K]	**RYFXFW20M**	Rear Cabinet Assembly (Black) [Black Type]
K15 [CR]	**RYFXFW20MC2**	Rear Cabinet Assembly (Red) [Red Type for Canada.]
K15-1	**RJC50002Z**	Terminal, Battery (−)
K15-2	**XTC3+8CFN**	Screw ⊕3×8 (Handle M'tg)
K15-3	**RKX320Y**	Arm, Handle (Silver)
K15-4 [K]	**RKX343Z**	Handle (Black) [Black Type]
K15-4 [CR]	**RKX343Z1**	Handle (Red) [Red Type for Canada.]

Ref. No.	Part. No.	Part Name & Description
	ACCESSORIES	
A1 [M]	**RD9448M**	AC Adapter ⚠ (For U.S.A.)
A1 [C]	**RD9403MC**	AC Adapter ⚠ (For Canada)
A2 [M]	**RQX4738Z**	Operating Instructions (For U.S.A.)
A2 [C]	**RQX4747Z**	Operating Instructions (For Canada)
	PACKINGS	
P1	**RPP435Z**	Poly Sheet, for Unit
P2	**RPN9517Z**	Pad, for Unit
P3 [M]	**RPK2211Z**	Inside Carton (For U.S.A.)
P3 [C]	**RPK2231Z**	Inside Carton (For Canada)
P4	**RPN4872Z**	Pad, Top
P5	**RPN4980Z**	Pad (for Accessories)

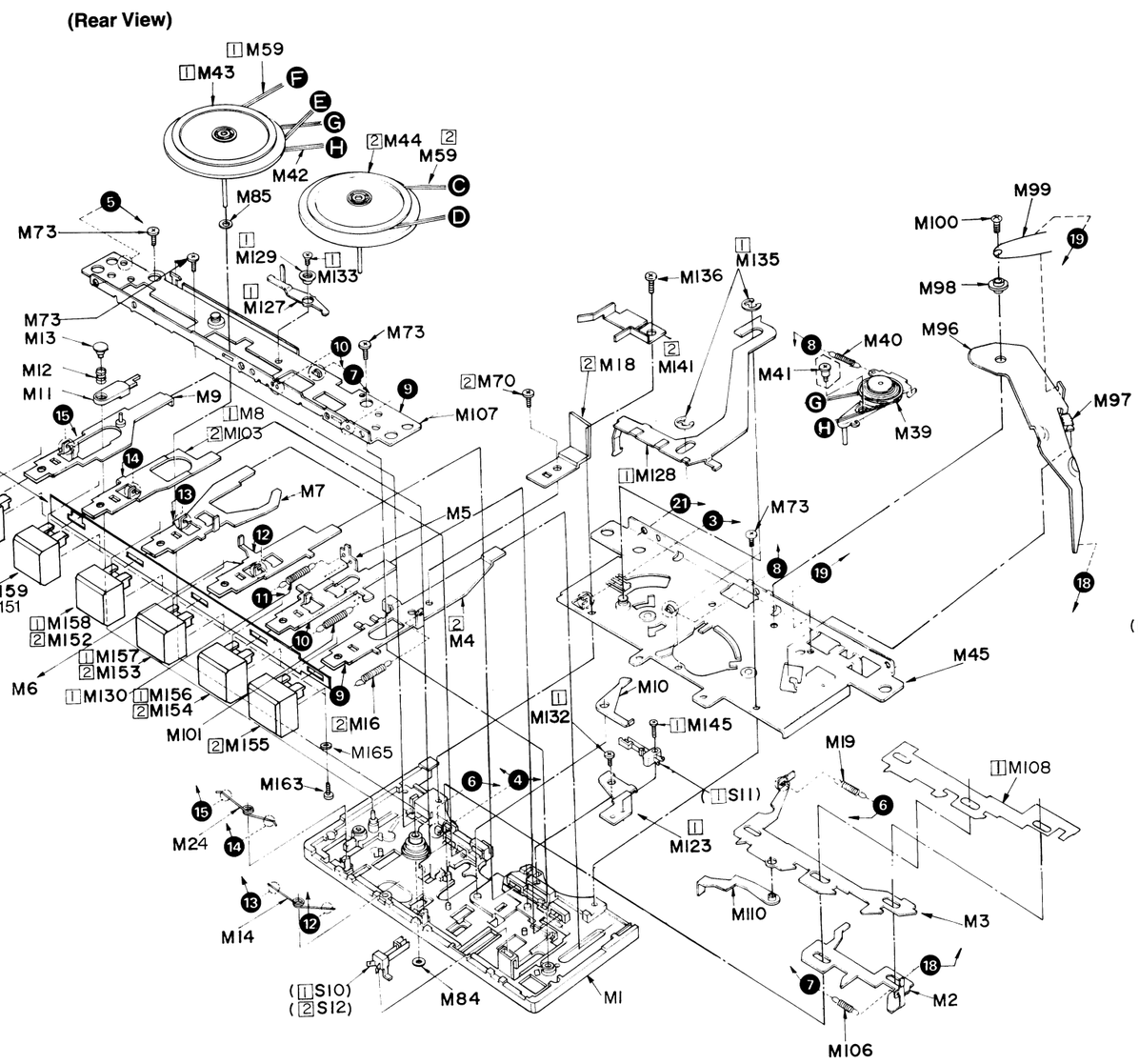
differ due

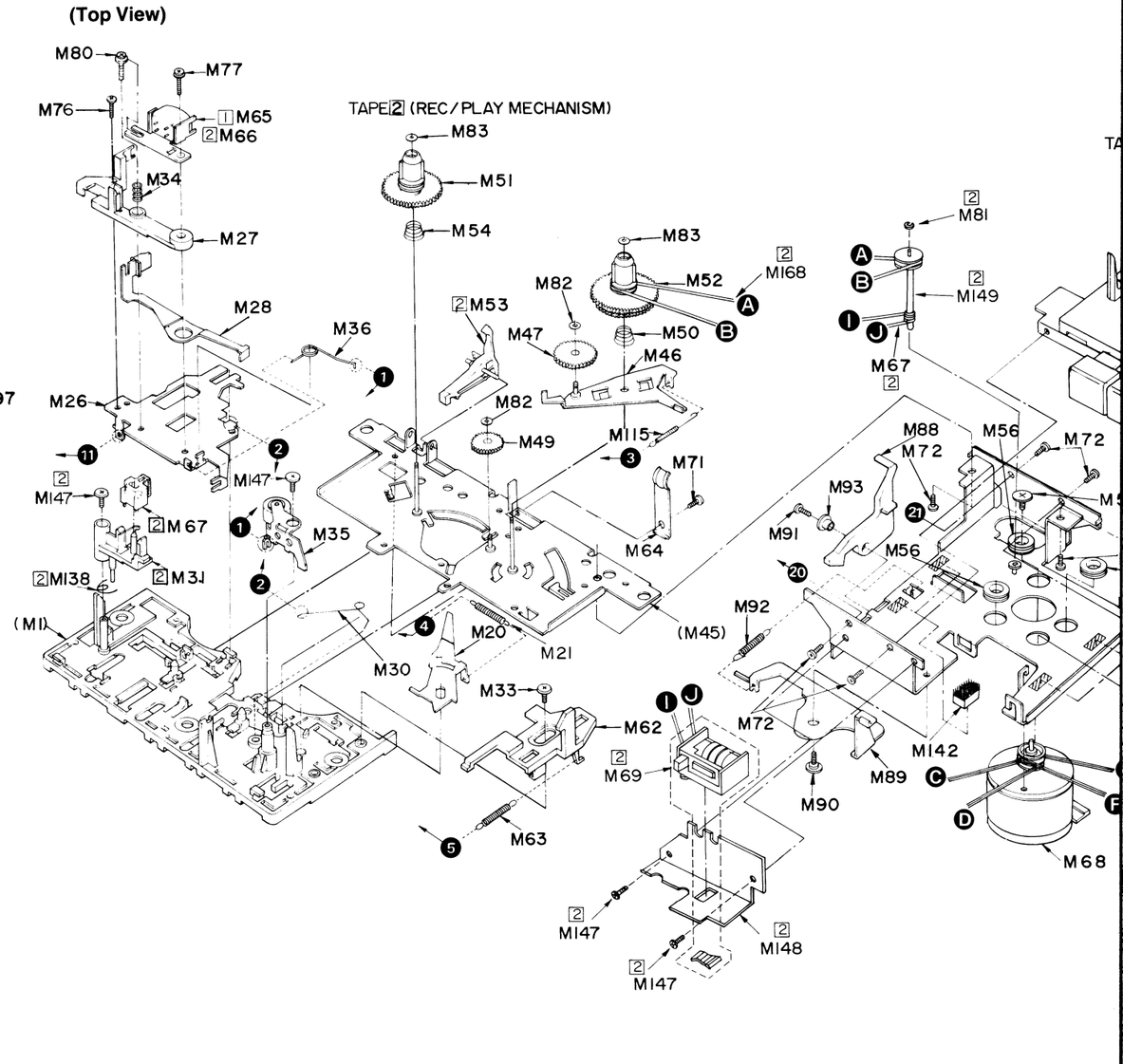
molding marks

Tape 2
Fig. 6

RX-FW20 RX-FW20

MECHANISM PARTS LOCATION

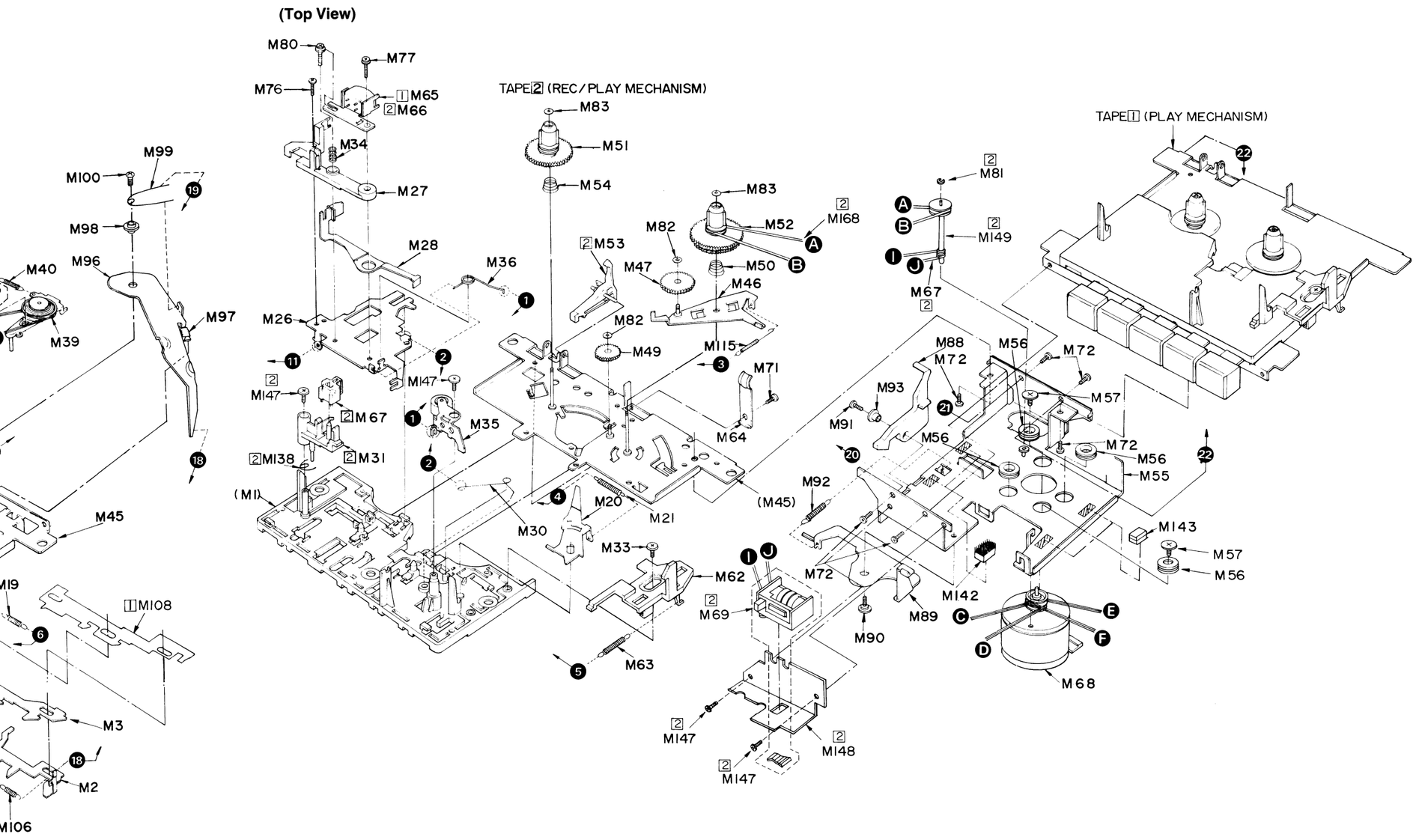




Ref NO.	M12	M14	M16	M19	M21	M24	M30	M36	M40	M63	M92	M99	M101	M106	M115
D, L	5.1 x 3.2		19.8 x 2.4	10.6 x 2.2	8.3 x 2.2				9.9 x 2.2	18.4 x 2	14.5 x 2.5		14.9 x 2.7	9.8 x 2.3	14.5 x 2.2
ϕ1, ϕ2		10.5 x 10.5				10 x 10	5 x 18	4 x 17				25 x 25			

| | | | |

MECHANISM PARTS LOCATION



24	M30	M36	M40	M63	M92	M99	M101	M106	M115	M130	M138
			9.9 x 2.2	18.4 x 2	14.5 x 2.5		14.9 x 2.7	9.8 x 2.3	14.5 x 2.2	15.5 x 2.7	
x 10	5 x 18	4 x 17				25 x 25					8 x 6

| | | | | |

■ MECHANISM PARTS LIST

REPLACEMENT PARTS LIST

The color name in parentheses ( ) in the parts list is the color of that part.

Notes:

[1] ... TAPE-1 (PLAY DECK)

[2] ... TAPE-2 (REC/PLAY DECK)

Ref. No.	Part. No.	Part Name & Description
		MECHANICAL PARTS
M1	**RFU68Z**	Button Base Ass'y
M2	**RFY541Z**	Lever, Switch Actuator
M3	**RFY641Z**	Lever, Push Button Actuator
M4 [2]	**RFY542Z**	Lever Ass'y, Record
M5	**RFY649Z**	Lever Ass'y Playback
M6	**RFY650Z**	Lever Ass'y, Rewind
M7	**RFY651Z**	Lever Ass'y, Fast Forward
M8 [1]	**RFY546Z**	Lever Ass'y, Stop/Eject
M9	**RFY547Z**	Lever Ass'y, Pause
M10	**RFY548Z**	Lever, Rewind
M11	**RFG86Z**	Cam, Pause
M12	**RFS459Z**	Spring, Pause Cam
M13	**RFS536Z**	Stopper, Pause Cam
M14	**RFS561Z**	Spring, REW/F.F Lever
M16 [2]	**RFS463Z**	Spring, Record Lever
M18 [2]	**RFS595Z**	Spring, Record Lever
M19	**RFS466Z**	Spring, Push Button Actuator Lever
M20	**RFY549Z**	Lever, Auto Stop Actuator
M21	**RFS596Z**	Spring, Auto Stop Actuator Lever
M24	**RFS462Z**	Spring, Stop • Eject/Pause Lever
M26	**RFU72Z**	Head Panel
M27	**RFU39Z**	Head Base
M28	**RFY394Z**	Detection Lever Ass'y
M30	**RFS568Z**	Spring, Head Panel
M31 [2]	**RFY391Z**	Arm, Erase Head
M33	**XSN3+6**	Screw ⊕3×6 (Stop/Eject Lever M'tg)
M34	**RFS447Z**	Spring, Azimuth Adj.
M35	**RFR36Z**	Pinch Roller Ass'y
M36	**RFS569Z**	Spring, Pinch Roller Ass'y
M39	**RFQ42Z**	RF Pulley Arm Ass'y
M40	**RFS532Z**	Spring, RF Pulley Arm
M41	**RFE172Z**	Screw (RF Pulley Arm M'tg)
M42	**RFB62Z**	Belt, RF
M43 [1]	**RFF39Z**	Flywheel Ass'y
M44 [2]	**RFF40Z**	Flywheel Ass'y
M45	**RFU79Z**	Reel Table Base Ass'y
M46	**RFY652Z**	Lever, Take-up Reel Table Ass'y
M47	**RFG61Z**	Gear, Take-up Roller
M49	**RFG62Z**	Gear, Fast Forward
M50	**RFS537Z**	Spring, Back Tension (Takeup Side)
M51	**RFJ50Z**	Reel Table Ass'y, Supply
M52	**RFJ44Z**	Reel Table Ass'y, Take Up
M53 [2]	**SMQ4778**	Lever, Erase Safety
M54	**RFS563Z**	Spring, Back Tension (Supply Side)
M55	**RFD253Z**	Bracket, Motor
M56	**RFI27Z**	Cushion, Motor
M57	**SMQ4918**	Screw (Motor M'tg)
M59	**RFB63Z**	Belt, Main
M62	**RFY581Z**	Lever, Stop/Eject
M63	**RFS564Z**	Spring, Stop/Eject Lever
M64	**RFS534Z**	Spring, Cassette Tape Holder
M65 [1]	**RJH4C09GY**	Head, Playback
M66 [2]	**RJH4C09GX**	Head, Record/Playback
M67 [2]	**RJH2C12XZ**	Head, Erase
M68	**RFM69Z**	Motor Ass'y, with Pulley
M69 [2]	**RSE207Z**	Tape Counter
M70 [2]	**RFE229Z**	Screw (Record Lever M'tg)
M71	**XTN2+3B**	Screw ⊕2 :3, (Cassette Tape Holder M'tg)
M72	**XTN2+4B**	Screw ⊕2×4, (Motor Bracket, M'tg)
M73	**XSB2+4**	Screw ⊕2×4, (Sub Chassis, Reel Table Base M'tg)

Ref. No.	Part. No.	Part Name & Description
M76	**RFE98Z**	Screw (Head Base M'tg)
M77	**XSN2+7**	Screw ⊕2×7, (Record/Playback Head M'tg)
M80	**RFE230Z**	Screw (Azimuth Adj.)
M81 [2]	**RFN131Z**	Washer (Counter Intermediate Pulley)
M82	**RFN143Z**	Washer (Fast Forward Gear, Take-up Roller)
M83	**RFN142Z**	Washer (Supply Reel Table, Take-up Reel Table)
M84	**RFN123Z**	Washer (Flywheel M'tg)
M85	**RFN153Z**	Washer (Flywheel)
M88	**RFY582Z**	Lever, Pause Kick (B)
M89	**RFY583Z**	Lever, Pause Kick (A)
M90	**RFE239Z**	Screw (Pause Kick Lever (A) M'tg)
M91	**XTN2+6FN**	Screw ⊕2×6 (Pause Kick Lever (B) M'tg)
M92	**RFY585Z**	Spring, Pause Kick Lever (A)
M93	**RFX134Z**	Collar, Pause Kick Lever (B)
M96	**RFY601Z**	Lever, Brake
M97	**RFI37Z**	Brake Shoe
M98	**RFX133Z**	Collar, Brake Lever
M99	**RFS579Z**	Spring, Brake Lever
M100	**XTN2+4FFN**	Screw (Brake Lever M'tg)
M101	**RFS566Z**	Spring, Playback Button Lever
M103 [2]	**RFY653Z**	Lever Ass'y, Stop/Eject
M106	**RFS567Z**	Spring, Switch Actuator Lever
M107	**RFU70Z**	Sub Chassis Ass'y
M108 [1]	**RFY622Z**	RF Actuator
M110	**RFY591Z**	Lever, E Kick
M115	**RFS570Z**	Spring, Tape-up Reel Table
M123 [1]	**RFD230Z**	Bracket, Switch
M127 [1]	**RFY589Z**	Lever, RC
M128 [1]	**RFY573Z**	Lever, RC Slide
M129 [1]	**RFX130Z**	Collar, RC Lever
M130 [1]	**RFS572Z**	Spring, RC
M132 [1]	**RFE221Z**	Screw (Switch Bracket M'tg)
M133 [1]	**XQS2+25**	Screw (RC Lever M'tg)
M135 [1]	**XUC2FT**	Stop Ring (RC Slide Lever M'tg)
M136	**RFE222Z**	Screw (Pause Prevention Bracket M'tg)
M138 [2]	**RFS535Z**	Spring, Erase Head Arm
M141 [2]	**RFD232Z**	Bracket, Pause Prevention
M142	**RFI41Z**	Mat-A
M143	**RFI35Z**	Mat-B
M145 [1]	**RFE102Z**	Screw (Leaf Switch M'tg)
M146	**XQS17+35**	Screw, ⊕1,7×35 (RF Switch Lever M'tg)
M147	**RFE251Z**	Screw (Pinch Roller, Erase Head Arm etc. M'tg)
M148 [2]	**RFD254Z**	Bracket, Tape Counter
M149 [2]	**RFQ43Z**	Pulley, Counter Intermediate
M150 [2]	**RBC822Z**	Button, Pause (Silver)
M151 [2]	**RBC823Z**	Button, Stop/Eject (Silver)
M152 [2]	**RBC824Z**	Button, Fast Forward (Silver)
M153 [2]	**RBC825Z**	Button, Rewind (Silver)
M154 [2]	**RBC826Z**	Button, Playback (Silver)
M155 [2]	**RBC827Z**	Button, Record (Silver)
M156 [1]	**RBC828Z**	Button, Playback (Silver)
M157 [1]	**RBC829Z**	Button, Rewind (Silver)
M158 [1]	**RBC830Z**	Button, Fast Forward (Silver)
M159 [1]	**RBC831Z**	Button, Stop/Eject (Silver)
M160 [1]	**RBC832Z**	Button, Pause (Silver)
M163	**XTN2+6B**	Screw ⊕2×6 (Button M'tg)
M164	**RHR3070Z**	Cover, Button Mechanism
M165	**XWG2**	Washer ∅2 (Button M'tg)
M167 [2]	**RFB67Z**	Belt, Tape Counter
M168 [2]	**RFB68Z**	Belt, Tape Counter Intermediate

HOW TO DISASSEMBLY & ASSEMBLY

■ DISASSEMBLY OF MECHANISM UNIT

Removal of the motor attachment bracket will separate the Tape [1] and Tape [2] units.

1. Remove the tape counter belt.
2. Remove the flywheel belts and secure these to the motor.
3. Remove the motor attachment bracket.
   Seven screws (2×4)mm (A). (See Fig. 1.)

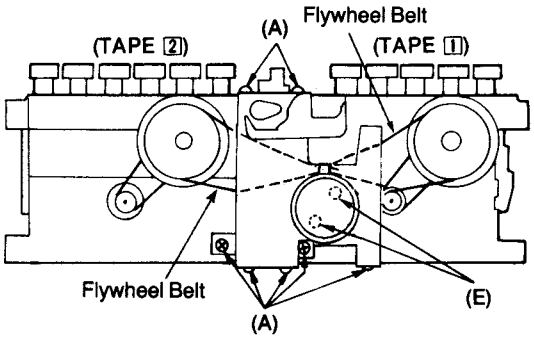


Fig. 1

■ ASSEMBLY OF MOTOR ASS'Y

1. Attach both flywheel belts to the motor pulley.
2. Bring the flywheel belts to the rear and attach them temporarily to the motor terminal (broken lines).
3. Attach the motor ass'y to tape [1] and tape [2] mechanisms with the seven screws (2×4) mm (A). (See Fig. 1.)
4. Attach the flywheel belts to the flywheels (solid line).

■ DISASSEMBLY OF MAJOR MECHANISM PARTS

- **Head**
  Remove the two screws (2×7)mm (B). (See Fig. 2.) (Be sure to adjust the azimuth after reattaching.)
- **Pinch roller**
  Remove the screw (3×6)mm (C). (See Fig. 2.)
- **Erasure head**
  (Tape [2] unit only)
  Remove the screw (3×6)mm (D). (See Fig. 2.)

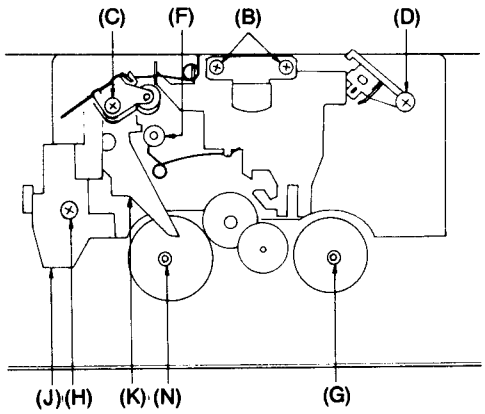


Fig. 2

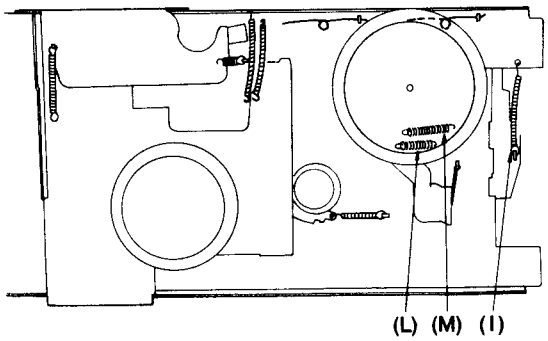


Fig. 3

- **Motor**
  Remove the motor attachment braket, which will separate the Tape [1] and Tape [2] unit. (See Fig. 1.)
  Remove the two colored screws (E). (See Fig. 1.)
- **Flywheel**
  Temporarily secure the flywheel belts to the motor. Remove the Fast Forward belt. Remove the washer (F). (See Fig. 2.)
  washer (F). (See Fig. 2.)
- **Supply reel table**
  Remove the washer (G). (See Fig. 2.)
- **Take-up reel table**
  Remove the screw (3×6)mm (H). (See Fig. 2.)
  Remove the spring (I). (See Fig. 3.)
  Remove the cassette eject lever (J). (See Fig. 2.)
  Remove the auto lever (K). (See Fig. 2.)
  Remove the spring (L). (See Fig. 3.)
  Remove the spring (M). (See Fig. 3.)
  Remove the washer (N). (See Fig. 2.)